What makes an image memorable?

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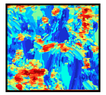
Motivation

Intrinsic memorability?

Database

What image content matters?

Prediction algorithm

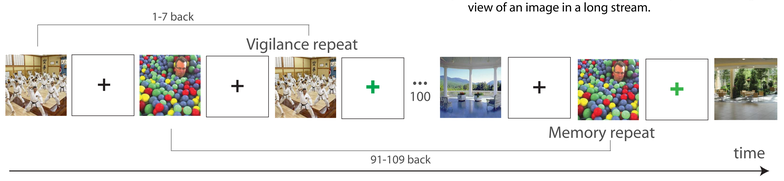


Memory Game

665 participants on Amazon's Mechanical Turk.

Database: 2222 photographs from SUN database (*Xiao et al. 2010*).

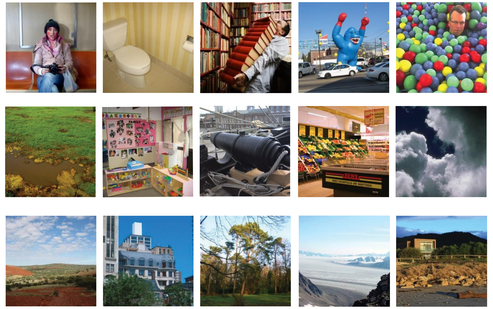
Memorability = probability of correctly detecting a repeat after a single view of an image in a long stream.

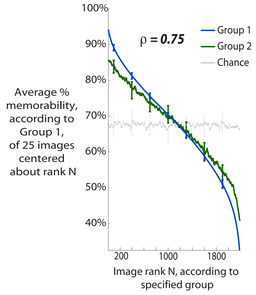


Memorable

Average

Forgettable

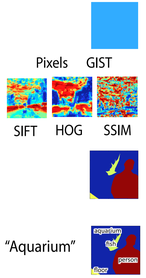




Wide range of memorabilities and high inter-subject consistency

What classes of information predict memorability?

Prediction algorithm: SVM Regression with non-linear kernels

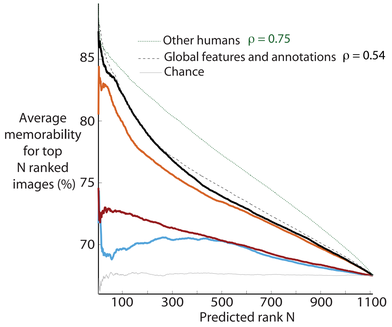


1) Simple image stats? — ρ = 0.16
e.g. mean hue, brightness, number of objects

2) Global image features? — ρ = 0.46
pixel histograms, GIST, SIFT, HOG, SSIM

3) Object segmentation statistics? — ρ = 0.20
histograms of object segments counts, sizes, and rough positions

4) Object and scene semantics? — ρ = 0.50
number, size, and rough position of each object class; scene category



Rich features necessary

What content makes an image memorable?

Object score = (prediction when object included in image's feature vector) - (prediction when object removed)

Objects shaded according to object score (computed per image)

− 0.15 0 + 0.09

Objects ranked according to object score (averaged across images)

Scenes ranked according to their average memorability

Automatic predictions

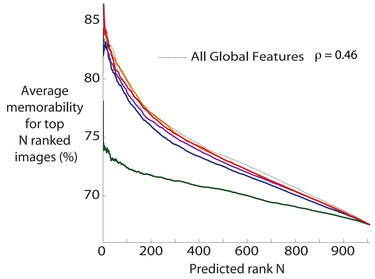
1) Pixel histograms — ρ = 0.22
Stacked RGB histograms.

2) GIST — ρ = 0.38
Filter bank with 8 orientations, 4 scales, averaged over a 4x4 grid. RBF kernel.

3) Dense SIFT — ρ = 0.41
Dense descriptors quantized into visual words and summarized in spatial pyramid histogram.

4) SSIM — ρ = 0.43
Same construction as SIFT, but with SSIM descriptors.

5) HOG2x2 — ρ = 0.43
Same again, but with HOG2x2 descriptors, each of whcih is a stack of 2x2 neighboring HOG descriptors.



Predicted memorable

Predicted average

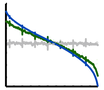
Predicted forgettable

Errors -- Overpredicted

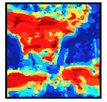
Errors -- Underpredicted

Conclusions

Stable intrinsic memorability



Standardized database

People, close-ups, and human-scale objects predict memorability

Predictable from global features